



**DMM155 & DMM157
Digital Multimeters
Instructions**

070-8943-02





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Safety

This manual contains information and warnings that must be followed for operating the instrument safely and maintaining the product in a safe operating condition.

 **CAUTION.** *Caution statements identify conditions or practices that could result in damage to the equipment or other property.*

 **WARNING.** *Warning statements identify conditions or practices that could result in personal injury or loss of life.*

Terms as Marked on Equipment



ATTENTION
Refer to manual



Double Insulated

Do Not Operate Without Covers — To avoid personal injury, do not apply any voltage or current to the product without the covers in place.

Electric Overload — Never apply a voltage to a connector on the product that is outside the range specified for that connector.

Do Not Immerse — The product is not waterproof.

Product Description

The DMM155 and DMM157 are rugged, handheld digital multimeters that allow you to make accurate measurements quickly and easily. Whether you are a professional or hobbyist, these instruments provide a useful range of features:

- Shock-absorbing cover
- Tilt stand, holster hook, and probe holders
- $3\frac{1}{2}$ digit (2000 count) LCD display
- Auto range (volts, ohms) and manual selection
- Measurement hold or offset
- Measures DC and AC voltages, DC and AC current, resistance, diode voltage, continuity, and capacitance (DMM157)
- Overvoltage and overload protection
- Low-power ohms setting
- Diode and continuity tester with audible signal
- Alarm that warns of improper connections to the current inputs
- Recessed input jacks for safety
- Automatic power off after 30 minutes prolongs battery life
- Low-battery indicator
- Uses standard 9 V battery

Controls and Connectors

See Figure 1 for location of controls and connectors.

1. **HOLD** — Holds or “freezes” the measurement display.
2. **OFFSET** — Offsets the measurement. This subtracts the last two digits from subsequent measurements.
3. **VΩ \rightarrow (or VΩ \leftarrow)** — Input for measuring volts, ohms, diodes, and continuity. (The DMM157 also measures capacitance.)
4. **COM** — Input for the common (ground reference) connection.
5. **mA** — Input for measuring current up to 200 mA.
6. **10A** — Input for measuring current above 200 mA.
7. **Rotary Switch** — Selects the multimeter function: volts, ohms, diodes, continuity, or amperes. (The DMM157 also measures capacitance.)
8. **AC/DC, Ω /LP Ω** — Selects AC or DC voltage, AC or DC current, high- or low-power ohms.
9. **RANGE, RESET** — Press this button to select one measurement range. Hold it down for 2 seconds to return to auto range. This control will also restore the display after automatic power off.
10. **Digital Display** — This liquid crystal display (LCD) has a maximum reading of 1999 ($3\frac{1}{2}$ digit). The display indicates auto range, auto polarity, decimal point, overrange, AC (DC implied), Ω /LP Ω , measurement units, hold, and offset.

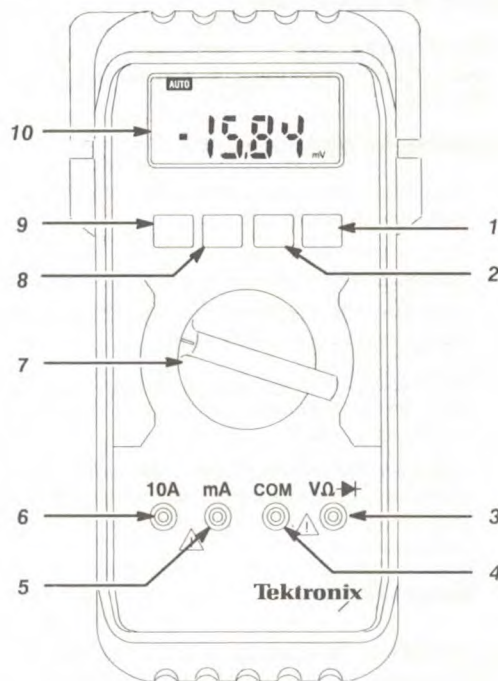


Figure 1: Controls and Connectors


Using the Multimeter

Please read this section to learn how to use your DMM155 or DMM157 Digital Multimeter safely and efficiently.

Preparing for Measurement

1. Wait 30 seconds after turning on the meter before making a measurement.
2. Set the rotary switch to the function you want to use before connecting the probes to voltage or current. Disconnect the test leads from the voltage or current before selecting a new function.
3. Disconnect power to the equipment under test if you are measuring resistance or capacitance, testing continuity, or checking diodes.
4. If you use the multimeter near equipment that generates electromagnetic interference, the display may be unstable or indicate incorrect measurement values.

Measuring Voltage

 **WARNING.** Do not apply more than 600 VDC or 600 VAC_{RMS} to the input. Do not apply more than 600 VDC or 600 VAC_{RMS} between the COM input terminal and earth ground. Exceeding these limits creates a shock hazard to the user and can also damage the meter.


Use extreme caution to avoid personal contact with high voltage when measuring in high voltage circuits.

1. Connect the black test lead to the **COM** (–) terminal and the red test lead to the **VΩ** (+) terminal.

2. Set the rotary switch to the **V** function.
3. Press the **AC/DC** button to select AC or DC measurement. (The display indicates AC but not DC.)
4. Connect the test leads across the source or load. The multimeter automatically selects the range and displays the polarity and voltage. Input voltage that exceeds the selected range causes the most-significant digit ("1" or "–1") to flash.

Measuring Resistance

1. Connect the black test lead to the **COM** terminal and the red test lead to the **VΩ** terminal.
2. Set the rotary switch to the **Ω** position to measure resistance up to 2 MΩ; set it to the **2–20 MΩ** position to measure resistance from 2 MΩ to 20 MΩ.

 **WARNING.** To prevent possible personal injury or damage to the meter, make sure the device being tested is off and no source of voltage is present.

3. To measure in-circuit resistance shunted by semiconductor junctions, press the **Ω/LPΩ** switch for lower power resistance measurements. The display indicates "LPΩ".
4. Connect the test leads across the resistance. For the best accuracy when measuring low resistance, short the test leads together and press **RANGE**; then press the **OFFSET** button. This selects the lowest range and compensates it for the resistance of the test leads.

Checking Continuity

1. Connect the black test lead to the **COM** terminal and the red test lead to the **V Ω** terminal.
2. Set the rotary switch to the **\rightarrow** position.
3. Connect the test leads across the resistance. The beeper sounds if the measurement is lower than 25 Ω and continues to sound until the resistance increases to greater than 200 Ω .

Testing Diodes

1. Set the rotary switch to the **\rightarrow** position.

NOTE. Do not use AC volts for testing diodes.

2. Connect the black test lead to the **COM** (–) terminal and the red test lead to the **V Ω** (+) terminal.
3. Connect the test leads across the diode to check. Normally, the forward voltage drop of good silicon diodes is between 0.400 V and 0.900 V. If the diode under test is defective, “000” (short circuit) or approximately 2.6 V (non-conducting) is displayed.
4. **Reverse Bias Check.** The display reads approximately 2.6 V with the diode reverse biased. The multimeter displays “000” or some other value lower than 2.6 V if the diode is shorted (or resistive).

Measuring Capacitance (DMM157)

1. Connect the black test lead to the **COM** terminal and the red test lead to the **V Ω \rightarrow** terminal.
2. Set the rotary switch to the range needed (**2 μ F–200 μ F**) for the capacitance to be measured.
3. Measure capacitance by placing the test leads across the component. Observe polarity markings (if any) on

the capacitor by placing the red lead on the (+) and the black lead on the (–) component leads.

Measuring Current

1. Connect the black test lead to the **COM** terminal and the red test lead to the **mA** terminal for a maximum of 200 mA. For a maximum of 10 A, move the red test lead to the **10 A** terminal. (The multimeter will indicate to a maximum of 13 A, but the maximum measuring time at that current level is 30 seconds.)
2. Set the rotary switch to the range needed (**2 mA–10 A**) for the current to be measured. Select AC or DC current measurement using the **AC/DC** switch.

NOTE. If you do not know the correct current range, start at the highest range and work down.

3. Connect the test leads in series with the load under measurement.

Holding a Measurement

To retain a measurement, press the **HOLD** button. The hold indicator (**H**) appears on the display and the reading will not change. Press the **HOLD** button again to continue with normal operation.

Offsetting a Measurement

Pressing the **OFFSET** button subtracts the two least significant digits from a selected range. You must not be in auto range. The multimeter offsets subsequent measurements.

The offset feature is especially useful when you want to subtract the lead resistance from very low resistance measurements or detect small voltage, capacitance, or current variations.

Extending the Display Resolution

Once you exceed the count of 1999 on a selected range you may still interpret the reading up to a count of 2999:

1. Select the next higher range (or auto range) and verify that the count does not exceed 299.
2. Return to the lower range. Interpret the flashing "1" as a "2" and read the lower three digits.

Selecting a Range

Press **RANGE** to make repeated measurements without automatically ranging. The first press selects the same range and removes the **AUTO** symbol. Continue to press the **RANGE** button to step through the available ranges.

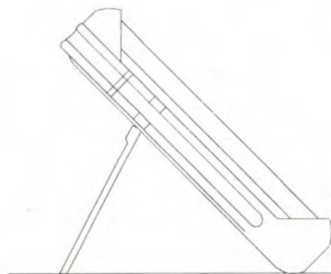
Press and hold the **RANGE** button for 2 seconds to return to auto range.

If you apply a voltage that exceeds the maximum reading of the display, the multimeter flashes the most significant digit to indicate overrange. Select a higher range or auto range to display the measurement.

Resetting the Display

If you leave the multimeter on longer than 30 minutes without using it, the display will automatically turn off. To return the display without disturbing any other setup, press **RESET (RANGE)**.

Using the Tilt Stand and Holster Hook



Swing the stand out for easier meter reading.



Swing the upper holster hook out and hook it over a door or mount the multimeter to a vertical surface with a screw.

Figure 2: Using the Tilt Stand and Holster Hook

Using the Probe Holders

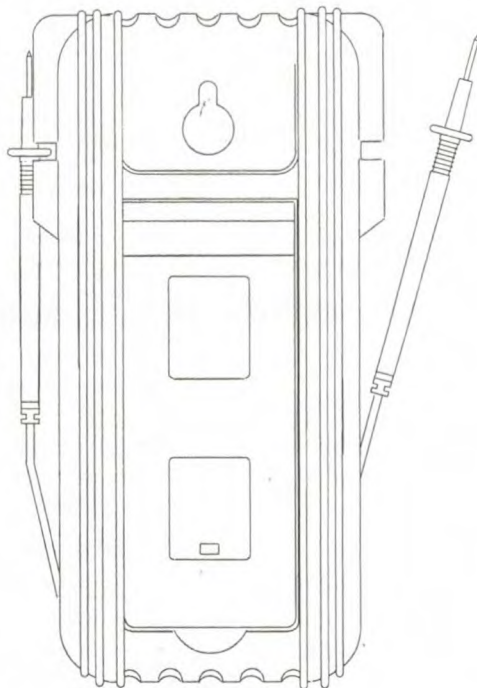


Figure 3: Using the Probe Holders

Replacing the Battery

The meter uses a single 9 V battery. Refer to Figure 4, and use the following procedure to replace the battery:

1. Disconnect the test leads from any circuit under test and turn off the meter.
2. Remove the test leads and the protective holster from the meter.
3. Lay the meter face down on a work surface that will not damage the meter face.
4. Remove the screw from the case bottom using a small Phillips screwdriver.
5. Gently lift the case bottom at the end nearest the LCD until it unsnaps from the case top.
6. Lift the battery from the case top, and carefully disconnect the battery connector from the battery.
7. Snap the battery connector to the terminals of the replacement battery, and replace the battery in the case top.
8. Replace the case top. Make sure the battery leads do not get pinched between the case top and case bottom. Make sure all the gaskets properly seat and the two snaps on the case top engage.
9. Reinstall the screw in the case bottom.

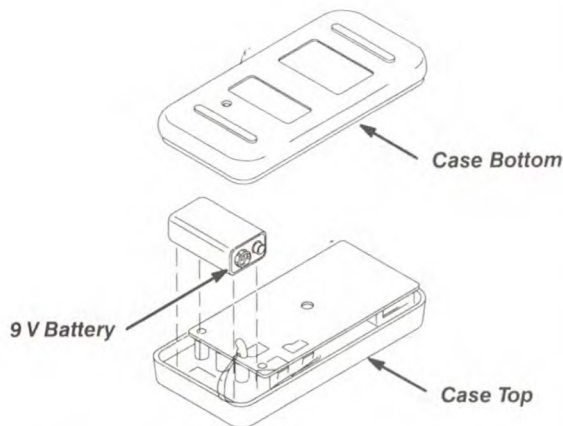


Figure 4: Replacing the Battery

Replacing the Fuses

Refer to Figure 5, and use the following procedure to examine or replace the meter fuses:

1. Perform steps 1 through 5 of the *Replacing the Battery* procedure on page 11.
2. Lift the circuit board from the case top. Do not remove the screws from the circuit board.
3. Remove a defective fuse by gently prying one end of the fuse loose and sliding the fuse out of the fuse holder.
4. Install a new fuse of the same size and rating. Make sure the new fuse is centered in the fuse holder.

⚠ CAUTION. To prevent product damage, make sure that the rotary switch and circuit board switch are both in the OFF position. Notice the pointing direction of the rotary switch and circuit board switch are 180° opposite each other.

5. Replace the case top. Make sure all the gaskets properly seat and the battery leads are not pinched between the two halves of the case. Make sure the two snaps on the case top engage.
6. Reinstall the screw in the case bottom.

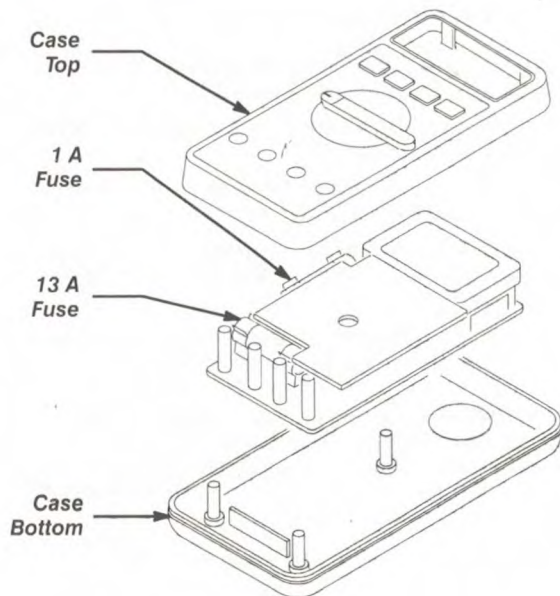


Figure 5: Replacing the Fuses

Replacement Parts


Table 1 provides a list of replacement parts for the DMM155 and DMM157 Digital Multimeters. For further information about the availability of replacement parts, contact your nearest Tektronix sales office.

Table 1: Replacement Parts

Item	Qty	Description	Part Number
Battery	1	9 V	146-0017-00
Fuse	1	1A, 600 V _{RMS}	159-0337-00
Fuse	1	13A, 600 V _{RMS}	159-0357-00
Test Lead Set	1	Test leads for input connectors	196-3408-XX
Protective Cover	1	Holster	118-9023-XX
Manual	1	Instructions	070-8943-XX

Specifications

General Characteristics

Display	3½ digit Liquid Crystal Display (LCD) with a maximum reading of 1999. Extended resolution of 2999 counts is possible in manual range mode. In the extended resolution operating mode, readings above 1999 are displayed with a blinking "1" most significant digit. The blinking "1" should be interpreted as the digit 2. The three least significant digits display data normally.
Polarity Indication	Automatic; positive implied, negative indicated
Overrange Indication	"1" or "-1" blinks
Low Battery Indication	The  symbol is displayed when the battery voltage drops below the operating voltage level.
Sampling Rate	2 times/second
Operating Temp.	0° C to +35° C, 0–80% R.H. 35° C to +50° C, 0–60% R.H.
Storage Temp.	–20° C to +60° C, 0–80% R.H. with battery removed from the multimeter
Power Supply	Single standard 9 V battery: NEDA 1604, JIS006P, or IEC6F22
Battery Life	Alkaline 400 hours
Dimension (HxWxD)	165 mm × 85 mm × 38 mm (6.5 in x 3.3 in x 1.5 in) with holster
Weight (including battery & holster)	DMM155: 380 g (13.4 oz) DMM157: 390 g (13.8 oz)

Accessories

Test leads (pair), protective holster, battery, and instructions

Measurement Ranges and Accuracies

Accuracies are \pm (% reading + number of digits) at 23° C \pm 5° C, at less than 75% R.H. (relative humidity).

DC Volts

Ranges	200 mV, 2 V, 20 V, 200 V, 600 V
Accuracy (DMM155)	200 mV range: \pm (1.0% reading + 2 digits) 2 V, 20 V, 200 V, 600 V ranges: \pm (0.7% reading + 2 digits)
Accuracy (DMM157)	200 mV range: \pm (0.8% reading + 2 digits) 2 V, 20 V, 200 V, 600 V ranges: \pm (0.5% reading + 2 digits)
Input Impedance	10 M Ω paralleled by less than 100 pF
Overload Protection	600 VDC/VAC _{RMS} all ranges
Resolution (by range)	200 mV 100 μ V 2 V 1 mV 20 V 10 mV 200 V 100 mV 600 V 1 V

AC Volts

Ranges	2 V, 20 V, 200 V, 600 V
Accuracy (DMM155)	\pm (1.7% reading + 4 digits) 50 Hz to 400 Hz
Accuracy (DMM157)	\pm (1.5% reading + 4 digits) 50 Hz to 400 Hz
Input Impedance	10 M Ω paralleled by less than 100 pF
Overload Protection	600 VDC/VAC _{RMS} all ranges

Resolution (by range)

2 V	1 mV
20 V	10 mV
200 V	100 mV
600 V	1 V

DC Current

Ranges	2 mA, 200 mA, 10 A (10 A range: 30 seconds maximum above 10 A input up to 13 A)
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Accuracy (DMM155)	2 mA, 200 mA ranges: $\pm (1.2\% \text{ reading} + 2 \text{ digits})$ 10 A range: $\pm (2.5\% \text{ reading} + 5 \text{ digits})$
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Accuracy (DMM157)	2 mA, 200 mA ranges: $\pm (1.0\% \text{ reading} + 2 \text{ digits})$ 10 A range: $\pm (2.5\% \text{ reading} + 3 \text{ digits})$
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Overload Protection	
mA input	1 A (240 V) fast-blow fuse
10 A input	13 A (240 V) fast-blow fuse

Resolution (by range)

2 mA	1 μ A
200 mA	100 μ A
10 A	10 mA

AC Current

Ranges	2-mA, 200 mA, 10 A (10 A range: 30 seconds maximum above 10 A input up to 13 A)
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Accuracy (DMM155)	2 mA, 200 mA ranges: $\pm (1.7\% \text{ reading} + 4 \text{ digits})$ 50 Hz to 400 Hz 10 A range: $\pm (2.9\% \text{ reading} + 7 \text{ digits})$ 50 Hz to 400 Hz
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Accuracy (DMM157)	2 mA, 200 mA ranges: $\pm (1.5\% \text{ reading} + 4 \text{ digits})$ 50 Hz to 400 Hz 10 A range: $\pm (2.9\% \text{ reading} + 5 \text{ digits})$ 50 Hz to 400 Hz
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Overload Protection	
mA input	1 A (240 V) fast-blow fuse
10 A input	13 A (240 V) fast-blow fuse

Resolution (by range)	
2 mA	1 μ A
200 mA	100 μ A
10 A	10 mA

Resistance

Ranges	200 Ω , 2 k Ω , 20 k Ω , 200 k Ω , 2 M Ω , 20 M Ω . (20 M Ω range measures approximately 2 M Ω to 20 M Ω only.)
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Accuracy (DMM155)	
20 M Ω Range	$\pm (2.5\% \text{ reading} + 4 \text{ digits})$
200 Ω Range	$\pm (1.2\% \text{ reading} + 2 \text{ digits})$
Other Ranges	$\pm (1.0\% \text{ reading} + 2 \text{ digits})$

Accuracy (DMM157)	
20 M Ω Range	$\pm (1.9\% \text{ reading} + 4 \text{ digits})$
200 Ω Range	$\pm (1.0\% \text{ reading} + 2 \text{ digits})$
Other Ranges	$\pm (0.8\% \text{ reading} + 2 \text{ digits})$

Overload Protection	600 VDC/VAC _{RMS} all ranges
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Test Voltage	
Low-Power Ohms Open-Circuit Voltage	Approximately 450 mV
High-Power Ohms Open-Circuit Voltage	Approximately 900 mV

Resolution (by range)

200 Ω	0.1 Ω
2 k Ω	1 Ω
20 k Ω	10 Ω
200 k Ω	100 Ω
2 M Ω	1 k Ω
20 M Ω	10 k Ω

Continuity Check

Threshold	The beeper sounds if the resistance of the circuit measured is < 25 Ω and turns off at > 200 Ω
Beeper Frequency	2 kHz
Overload Protection	600 VDC/VAC _{RMS}

Diode Test

Test Current	1.6 mA maximum
Test Voltage	3.3 V maximum open circuit
Overload Protection	600 VDC/VAC _{RMS}

Capacitance (DMM157)

Ranges	2 μ F, 20 μ F, 200 μ F
Accuracy	\pm (1.9% reading + 5 digits)
Resolution (by range)	
2 μ F	1 nF
20 μ F	10 nF
200 μ F	100 nF
Overload Protection	600 VDC/VAC _{RMS} all ranges

Auto Power Off

The multimeter will automatically shut off in about 30 minutes from the last function or mode change. The multimeter will turn on again when another range is selected or any key switch is pressed.

WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of three (3) years from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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